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July 28, 2000

BY HAND

Assistant Commissioner for Patents
Washington, D.C. 20231

Re: Patent Application For: IMPROVED TELEPROMPTER DEVICE

Inventor: Philip R. Krause

TRANSMITTAL LETTER

Sir:

Enclosed herewith are the following papers for filing in the United States Patent and Trademark Office in connection with the above-identified application:

- (1) a specification comprising 33 pages, including an abstract;
- (2) 20 claims, contained in the specification;
- (3) 4 sheets of formal drawings;
- (4) a Verified Statement Claiming Small Entity Status (Independent Inventor) for inventor Philip R. Krause;
- (5) a Declaration for Patent Application by inventor Philip R. Krause;
- (6) A fee transmittal;
- (7) a check in the amount of \$345, to cover the filing fee for a small inventor (\$345) (20 claims).

This application is a continuation-in-part of Serial Number 09/015,660. Ser. No. 9/015,660 incorporated by reference Ser. No. 08/818,152, which has since issued as U.S. Patent No. 6,067,069. The claims of this continuation-in-part patent application relate more closely to the claims of U.S. Patent No.6,067,069, than to the claims at issue in Ser. No. 09/015,660.

09628729-072800

Variable	Mean	SD	Min	Max
Age	34.5	10.2	21	55
Gender	1.2	0.4	1	2
Marital status	1.5	0.5	1	3
Education	12.5	1.5	9	16
Income	1.8	0.8	1	3
Occupation	1.5	0.5	1	3
Health status	1.5	0.5	1	3
Life satisfaction	4.5	1.5	1	7
Depression	1.5	0.5	1	3
Stress	2.5	1.0	1	4
Resilience	3.5	1.0	1	5
Optimism	4.5	1.0	1	5
Gratitude	4.5	1.0	1	5
Forgiveness	4.5	1.0	1	5
Compassion	4.5	1.0	1	5
Kindness	4.5	1.0	1	5
Generosity	4.5	1.0	1	5
Patience	4.5	1.0	1	5
Self-control	4.5	1.0	1	5
Emotional stability	4.5	1.0	1	5
Psychological well-being	4.5	1.0	1	5
Life satisfaction	4.5	1.0	1	5
Depression	1.5	0.5	1	3
Stress	2.5	1.0	1	4
Resilience	3.5	1.0	1	5
Optimism	4.5	1.0	1	5
Gratitude	4.5	1.0	1	5
Forgiveness	4.5	1.0	1	5
Compassion	4.5	1.0	1	5
Kindness	4.5	1.0	1	5
Generosity	4.5	1.0	1	5
Patience	4.5	1.0	1	5
Self-control	4.5	1.0	1	5
Emotional stability	4.5	1.0	1	5
Psychological well-being	4.5	1.0	1	5

**STATEMENT CLAIMING SMALL ENTITY STATUS
(37 CFR 1.9(f) & 1.27(b))--INDEPENDENT INVENTOR**

Docket Number (Optional)

Applicant, Patentee, or Identifier: Philip R. Krause

Application or Patent No : _____

Filed or Issued: July 28, 2000

Title: Improved Teleprompter Device

As a below named inventor, I hereby state that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees to the Patent and Trademark Office described in:

☒ the specification filed herewith with title as listed above.

☐ the application identified above.

☐ the patent identified above.

I have not assigned, granted, conveyed, or licensed, and am under no obligation under contract or law to assign, grant, convey, or license, any rights in the invention to any person who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern, or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

☒ No such person, concern, or organization exists.

☐ Each such person, concern, or organization is listed below

Separate statements are required from each named person, concern, or organization having rights to the invention stating their status as small entities. (37 CFR 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

Philip R. Krause
NAME OF INVENTOR

NAME OF INVENTOR

NAME OF INVENTOR

Philip R. Krause
Signature of inventor

Signature of inventor

Signature of inventor

July 27, 2000
Date

Date

Date

FEE TRANSMITTAL for FY 2000

Patent fees are subject to annual revision.
Small Entity payments must be supported by a small entity statement,
otherwise large entity fees must be paid. See Forms PTO/SB/09-12.
See 37 C.F.R. §§ 1.27 and 1.28.

TOTAL AMOUNT OF PAYMENT (\$)
345.00

Complete if Known

Application Number
Filing Date **July 28, 2000**
First Named Inventor **Philip R. Krause**
Examiner Name
Group / Art Unit
Attorney Docket No.

METHOD OF PAYMENT (check one)

1. ☐ The Commissioner is hereby authorized to charge indicated fees and credit any overpayments to:

Deposit Account Number

Deposit Account Name

☐ Charge Any Additional Fee Required
Under 37 CFR §§ 1.16 and 1.17

2. ☒ Payment Enclosed:
☒ Check ☐ Money Order ☐ Other

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Small Entity Fee Code	Fee Description	Fee Paid
101 690	201 345	Utility filing fee	345
106 310	206 155	Design filing fee	
107 480	207 240	Plant filing fee	
108 690	208 345	Reissue filing fee	
114 150	214 75	Provisional filing fee	

SUBTOTAL (1) (\$)
345

2. EXTRA CLAIM FEES

Total Claims	Extra Claims	Fee from below	Fee Paid
20	-20** = 0	0	0
Independent Claims	3	- 3** = 0	0
Multiple Dependent			0

**or number previously paid, if greater; For Reissues, see below

Large Entity Fee Code	Small Entity Fee Code	Fee Description
103 18	203 9	Claims in excess of 20
102 78	202 39	Independent claims in excess of 3
104 260	204 130	Multiple dependent claim, if not paid
109 78	209 39	** Reissue independent claims over original patent
110 18	210 9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) (\$)
0

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Small Entity Fee Code	Fee Description	Fee Paid
105 130	205 65	Surcharge - late filing fee or oath	
127 50	227 25	Surcharge - late provisional filing fee or cover sheet	
139 130	139 130	Non-English specification	
147 2,520	147 2,520	For filing a request for reexamination	
112 920*	112 920*	Requesting publication of SIR prior to Examiner action	
113 1,840*	113 1,840*	Requesting publication of SIR after Examiner action	
115 110	215 55	Extension for reply within first month	
116 380	216 190	Extension for reply within second month	
117 870	217 435	Extension for reply within third month	
118 1,360	218 680	Extension for reply within fourth month	
128 1,850	228 925	Extension for reply within fifth month	
119 300	219 150	Notice of Appeal	
120 300	220 150	Filing a brief in support of an appeal	
121 260	221 130	Request for oral hearing	
138 1,510	138 1,510	Petition to institute a public use proceeding	
140 110	240 55	Petition to revive - unavoidable	
141 1,210	241 605	Petition to revive - unintentional	
142 1,210	242 605	Utility issue fee (or reissue)	
143 430	243 215	Design issue fee	
144 580	244 290	Plant issue fee	
122 130	122 130	Petitions to the Commissioner	
123 50	123 50	Petitions related to provisional applications	
126 240	126 240	Submission of Information Disclosure Stmt	
581 40	581 40	Recording each patent assignment per property (times number of properties)	
146 690	246 345	Filing a submission after final rejection (37 CFR § 1.129(a))	
149 690	249 345	For each additional invention to be examined (37 CFR § 1.129(b))	
Other fee (specify) _____			
Other fee (specify) _____			

* Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$)
0

SUBMITTED BY

Name (Print/Type)	Registration No. (Attorney/Agent)	Telephone
Thomas W. Krause	40,335	703/533-6771
Signature		Date 7/28/00

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IMPROVED TELEPROMPTER DEVICE

Related Applications

This application is a continuation in part of Application No. 09/015,660 filed January 29, 1998, to which
5 priority under 35 U.S.C. § 120 is claimed. This application contains material from No. 08/818,152, which was filed March 14, 1997, incorporated by reference in No. 09/015,660, and issued as U.S. Patent No. 6,067,069. The specification of No. 09/015,660 is incorporated herein by reference.

10

Background of the Invention

This invention relates generally to the fields of information processing and display by computers, and human-machine interfaces for computers. The present invention further relates to providing the user with an interface to control the
15 speed at which text is imaged on a computer display. The present invention further provides this interface in a manner which permits optimization of reading speed while minimizing the need to make changes in the fixation of the user's eyes.

Description of the Relevant Art

20

In the current art, computer programs which display text to a reader do not permit optimization of the user's reading speed. When the reader reaches the bottom of a page of displayed text, some manual operation is necessary to advance the display to the next page of text, resulting in a need to retrain the eye
25 on a new location and a consequent loss of reading speed. Alternatively, in teleprompter type systems, text is simply

presented at a constant rate, independently of the desire of the speaker to change rates as she speaks. Currently available text display systems, including printed books, also require frequent changes in the location of eye fixation in order to permit rapid
5 reading of a text.

One alternative is for the text to scroll from the bottom of a text window, but in practice, the need to manually advance the text using a scroll bar interferes with the reader's comprehension and enjoyment of the text. Only rarely can the
10 user optimize the speed of text display to correspond with a desired reading speed. The need to simultaneously pay attention to a scroll bar and to the text further distracts the reader and requires frequent changes in the location of eye fixation.

While it would be possible to set the text to scroll
15 from the end of a text window at a fixed rate of speed, thereby obviating the need to pay attention to a scroll bar, this strategy would have the disadvantages that the selected speed might not correspond precisely to the reader's wishes, and that the reader's desired speed of text reading might change as eye
20 fatigue sets in or as the material being read varies in complexity or in level of interest to the reader. Thus, providing the reader with a method to signal the computer regarding desired changes in rate of text display in a way which minimizes changes in ocular fixation and requires minimal manual
25 input would be a significant advance over the current art. This represents an entirely new style of reading, in which text is

dynamically provided to the reader by a computer system at a precisely optimized rate, rather than requiring the reader to repeatedly change locations of eye fixations as she or he reads through a statically displayed text.

5 Thus, the current art imposes the following disadvantages on a reader of a text who desires to maximize his or her reading speed while minimizing distractions and fatigue associated with extra eye movements.

10 First, no method exists in the current art to provide for variable speed presentation of text, in accordance with the reader's own interpretation of the level of difficulty of the text or level of interest in the text, as the text is being presented.

15 Second, no method exists in the current art to provide for variable speed presentation of text, without requiring manual signalling of the computer between pages or as the text is scrolled.

20 Third, no method exists in the current art to dynamically optimize the rate of text presentation to correspond precisely with a reader's actual reading speed.

 The present invention derives from the observation that if text were continuously scrolled from the end of a page, if the rate of text presentation were too slow, there would be a reader to find himself reading ahead of the optimal reading location. On
25 the other hand, if the rate of text presentation were too fast, the reader would find himself reading behind the optimal reading

location. According to the method, changes in the position of a cursor which is associated with a cursor control device are used as a cue for changing the rate of text presentation. In a preferred embodiment, this cursor control device is associated

5 with the position at which text is being read, such that leaving the cursor in a predefined neutral zone does not change the rate of text display, but moving the cursor to a position associated with text coming after that displayed in the predefined neutral zone (to an "acceleration zone") increases the rate of text

10 display, and moving the cursor to a position associated with text coming before that displayed in the predefined neutral zone (to a "deceleration zone") decreases the rate of text display. Moving the cursor to another predefined location (in a preferred embodiment, to the left or right edge of the screen) stops text

15 advance. In another preferred embodiment, the cursor movement may be determined by computer-assisted recognition of the location at which text is being read aloud.

This invention is in part enabled by the current art, which provides methods to signal a computer system regarding

20 location of ocular fixation or detection of head movements, for example, U.S. Patent Nos. 5,583,335, 5,526,022, 5,517,021, 5,422,689, 5,367,315, 5,360,971. Other methods of detecting direction of eye fixation or of head movement may also be used. Examples include sensors which consist of a ball within a hollow

25 sphere surrounded by detectors, such that changes in head movement are detected as changes in the location of the ball

One object of the present invention is to provide an improved teleprompter device that provides text to the reader at a rate that corresponds to the rate at which the reader is reading the text.

5 Another object of the present invention is to use information about where text is being read aloud to signal the computer system to increase or decrease the rate of text display in accordance with this cue.

10 Another object of the present invention is to take advantage of natural eye or head movements to signal the computer system to increase or decrease the rate of text display in accordance with these cues.

15 Another object of the present invention is to permit a reader to designate at least one preferred region on the screen (called the "neutral zone") such that the rate of text presentation remains approximately constant when the reader is reading text presented in this region.

20 Another object of the present invention is to provide a variable rate of text presentation that approximates the rate at which the reader is actually reading the text.

Another object of the present invention is to permit a reader to signal the computer to scroll backwards through a text, if necessary, to find a desired passage or to reread information of special interest.

25 Another object of the present invention is to permit a reader to designate screen regions such that when the computer is

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signaled that text is being read from these regions, the rate of
text presentation is accelerated or decelerated. Among other
embodiments, this may be accomplished by providing a
mathematical function of the distance from the neutral zone, such
5 that head or eye movement to positions outside the neutral zone
causes the rate of text presentation to decelerate or accelerate
according to this function of the distance.

Another object of the present invention is to permit a
reader to optimize his or her reading speed through a text,
10 according precisely to his or her preferences.

Another object of the present invention is to improve a
reader's comprehension of a text, by minimizing external
distractions as the text is being read.

The present invention, as broadly described herein,
15 provides a user interface and method for using a computer system
to permit a reader to optimize the rate at which text is
presented on a computer display controlled by the computer,
comprising the steps of determining the location on the computer
display at which text is being read by the reader, and varying
20 the rate at which text is presented in response to the result of
the location-determining step. In a preferred embodiment, the
invention comprises the steps of 1) defining a cursor location as
a location on the display corresponding to that at which text is
being read, 2) defining a neutral zone as at least one region of
25 the display at which reading or other consumption of information
presented by the computer system preferably takes place, 3)

zone the reader is, the more dramatic the effect on the rate of text presentation may be. In addition, in a simple embodiment, the function may be a constant, such that all cursor locations in a given type of zone yield the same effect on rate of text

5 presentation.

The various zones, such as the neutral zone, stop zones, acceleration zones and deceleration zones may be defined graphically, using a cursor-control device to specify their limits and shapes. These zones may be differentiated from one
10 another on the display by altering the attributes of text displayed in each zone, or by providing different backgrounds within each zone. In this manner, the user can adjust the non-rate parameters associated with text presentation to match his reading style or needs.

15 The cursor position which corresponds to the position at which text is being read may be determined by any cursor control device, including one which responds to eye, head or hand movements, or to audio input.

In a specific preferred embodiment, the invention
20 comprises using a computer system to determine the location on the computer display at which text is being read aloud by the reader, and to vary the rate at which text is presented in response to the result of the location-determining step.

Also, according to the present invention, a computer
25 system comprising means for effectuating the method of the present invention is provided. Further according to the present

invention, computer-readable memory encoded with a program directing the computer system to effectuate the method of the present invention is also provided.

Additional objects and advantages of the invention are set forth in part in the description that follows, and in part are obvious from the description, or may be learned by practice of the invention. The objects and advantages of the invention may also be realized and attained by means of the instrumentalities and combinations particularly pointed out in the appended claims.

Brief Description of the Drawings

The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate particular embodiments of the invention, and together with the description, serve to explain the principles of the invention.

FIG. 1 presents a block diagram of a computer system as may be utilized by the present invention.

FIG. 2 presents a flowchart, diagramming the two major steps of the invention, interface setup and the actual interface.

FIG. 3 illustrates a sample text display block, such as that which could be presented by text presentation or word processing programs. Regions on this block are shown to illustrate the function of the invention as described below in the detailed description of the preferred embodiments.

FIG. 4 illustrates a teleprompter embodiment of the invention, in which the described method can be used to optimize

the speed at which text is read aloud.

Detailed Description of the Preferred Embodiments

Reference will now be made in detail to the present preferred embodiments of the invention, examples of which are
5 illustrated in the accompanying drawings. The steps required to practice this invention are readily accomplished by a person of ordinary skill in the art of computer programming, with reference to this description and the accompanying drawings.

The invention is described in the context of a
10 computer system (100), as pictured in FIG. 1, which consists of a Central Processing Unit (102), memory and/or storage (which may include random access short term memory [104] or long-term storage such as a hard disk or other disk drives [108]), a Control function (106), and, a display device such as a monitor
15 (110), and one or more cursor control devices (128). In addition, such systems may contain additional means for input such as a keyboard (112), auxiliary input and storage devices (126), including scanners (124), audio input such as a microphone (118), audio output such as amplified loudspeakers (120), and
20 access to other computer systems via modem (116) or networks (122). The preferred embodiment is described in the context of a computer system which is capable of running programs in a Windows™ environment.

FIG. 2 presents a flow diagram of the invention. While
25 the invention can be practiced in a manner different from that

depicted in the flow diagram, the flow diagram provides a useful overview for understanding the invention. The invention involves, among other things, the use of a computer system, such as that depicted in FIG. 1, to display electronic text stored in the computer system or stored external to the computer system. As shown in FIG. 2, the invention comprises two steps, that of user interface setup (200) and the actual use of the interface (220). In some embodiments, the setup function might be performed in advance by the author of a computer program, or some other individual besides the end-user, leaving the user to use the interface as described. In other embodiments, the user has the flexibility to modify one or more parameters associated with the interface. In a preferred embodiment, the user may modify these parameters at any time while using the invention.

In a preferred embodiment, the setup procedure comprises the steps of querying the user via a dialog box regarding desired values for parameters which affect the user interface (202) and of storing the responses (204). Examples of parameters affecting the interface include the pathway that text takes as it advances across the display, including designation of the location on the display of the neutral zone (which is the preferred reading area), deceleration zones (for the display of text which comes before that displayed in the neutral zone) and acceleration zones (for the display of text which comes after that displayed in the neutral zone). The neutral zone is broadly defined as the preferred reading area, which may encompass one or

After collecting information regarding the configuration of the interface, in a preferred embodiment the computer system stores this information (204) in a manner which permits its retrieval as the interface functions, and also
5 permits the user access to the same parameter set on other occasions, obviating the need to completely redefine the parameters on each use of the invention.

The normal use of the interface (220) comprises the steps of the computer system determining the cursor location
10 (225), and changing the speed of text scrolling (240-246) depending on that location (230-236). A text is defined as any material which is meant to be presented in a certain linear order, for example, characters, numbers, figures or other graphics. Scrolling on a region of a display is defined as the
15 movement of text along a predefined pathway on the display, such that all lines shift in position along this pathway as new text is added, at the same rate at which new text is added, and such that when the limits of the regions defined for display of text are reached, text disappears if it would otherwise migrate beyond
20 those limits. Thus, according to this definition, text may be scrolled in clusters of one or more units (e.g., lines, characters, figures) at a time. In particular, scrolling means that text proceeds in some manner from one or more acceleration zones, through the neutral zone (where it is preferably read) and
25 through one or more deceleration zones prior to departure from the screen. In some preferred embodiments, it is possible to

hold some text items (e.g., figures, tables) on the screen for longer periods of time, or indefinitely, either within the normal pathway for text, or in a supplementary location.

The following definitions of functions and terminology
5 describe a preferred embodiment of the invention:

A text may be represented mathematically as a function $t(x)$ over some range of integers x , where x signifies a position within the text, and $t(x-1)$ comes before $t(x)$ and $t(x+1)$ comes after $t(x)$ for all defined values of t . As noted above,
10 different elements of a text t are not required to be of identical types, for example, various elements may be words, lines, characters, sounds, images, pictures, figures or other data that can be represented digitally. The only requirement regarding t is that it be of a sequential nature.

15 The descriptor $s_T(t(x))$ refers to the screen location of a text item $t(x)$ at a position x within a text t at some arbitrary time T . In a preferred embodiment, $s_T(t(x))$ is dependent on the pathway that text takes as it scrolls on the display, the rate of text display as calculated using the other
20 described functions, and the previous cursor movements.

Values of the function $d_T(x_1, x_2)$ describing the distance between two items at positions x_1 and x_2 within a text t at times T may be dynamically calculated from the values of x_1 , x_2 , and of the screen locations $s_T(t(x_1))$ and $s_T(t(x_2))$. In some
25 embodiments, $d_T(x_1, x_2)$ may be a function of a subset of these values. For all text items $t(x_1)$ and $t(x_2)$ both displayed in the

neutral zone at time T , $d_T(x_1, x_2)$ is defined as zero. All functions $d_T(x_1, x_2)$ fulfill the mathematical criteria for distance functions, such that for all x_1 , x_2 , and x_3 on which d_T is defined, $d_T(x_1, x_2) \geq 0$, $d_T(x_1, x_2) = d_T(x_2, x_1)$ and $d_T(x_1, x_2) +$

5 $d_T(x_2, x_3) \geq d_T(x_1, x_3)$. It may be seen that the distance between two text items may change with time, since d_T may be dependent on s_T , which in turn changes with time. Also, this distance function does not necessarily define distance in precisely the same way for items in acceleration and deceleration zones. In
10 one simple example of a distance function defined on a standard Windows™ text box, such that text scrolls from the bottom one line at a time, one may define the distance between two text items as the number of lines that separate them. In this example, if the neutral zone consisted of more than one line,
15 this function would measure distance between a text item and the neutral zone as the number of lines from the nearest border of the neutral zone, unless the text item were in the neutral zone, in which case the distance would be zero.

The rate change sign $\sigma(x_1, x_2)$ is defined such that

20 $\sigma(x_1, x_2) = 1$ when $x_1 \geq x_2$ and $\sigma(x_1, x_2) = -1$ when $x_1 < x_2$, where x_1 and x_2 are integers representing positions in a specified text. Thus, $\sigma(x_c, x_n)$ is positive when a text item at position x_c in the text t (normally defining the text item that is closest to the cursor location) comes after a text item at position x_n (normally
25 defined in the neutral zone), indicating a need to speed up the

rate of text presentation. On the other hand, $\sigma(x_c, x_n)$ is negative when a text item at position x_c in a text t (normally defining the text item that is closest to the cursor location) comes before a text item at position x_n (normally defined as in the neutral zone), indicating a need to slow down the rate of text presentation.

The rate of text presentation r_T is defined such that higher rates correspond to faster text presentation. If the cursor is in a stop zone, r_T is defined as zero. Otherwise, if the cursor remains outside of the neutral zone, the rate of text presentation r_T at time T may change as defined by a function $\partial_T(x_c, x_n)$ of $\sigma(x_c, x_n)$ and of the distance $d_T(x_c, x_n)$ between text $t(x_c)$ displayed at the location $s_T(t(x_c))$ closest to that specified by the cursor and text $t(x_n)$ displayed in the neutral zone at location $s_T(t(x_n))$, such that $dr_T/dT = \sigma(x_c, x_n) \cdot \partial_T(x_c, x_n)$, where \cdot denotes multiplication and where dr_T/dT represents the first derivative of the rate function r_T with respect to time.

The family of functions $\partial_T(x_1, x_2)$ fulfills the criteria that for all x_1 and x_2 , $\partial_T(x_1, x_2) \geq 0$, and $\partial_T(x_1, x_2) = 0$ when $d_T(x_1, x_2) = 0$. In a preferred embodiment, the function $\partial_T(x_1, x_2)$ may be a continuous or discrete function of $d_T(x_1, x_2)$ and $\sigma(x_1, x_2)$ for all x_1 , x_2 , and T , but normally is further constrained such that for all x_n , x_1 , x_2 , and T , where $s_T(t(x_n))$ is in the neutral zone, if $d_T(x_n, x_1) \geq d_T(x_n, x_2)$, then $\partial_T(x_n, x_1) \geq \partial_T(x_n, x_2)$. This

constraint permits definition of ∂_T such that the farther the reader's current position is from the neutral zone, the more dramatic the effect on the rate of text presentation will be. In addition, this constraint enables another embodiment that has the merit of simplicity in which ∂_T is constant when d_T is greater than 0, thereby applying a constant rate of acceleration or deceleration until neutral zone reading is resumed.

In many embodiments, for all x_1 , x_2 , and T , $\partial_T(x_1, x_2) = \partial_T(x_2, x_1)$, promoting symmetry of effect on rate when the cursor position is in the same relative position within acceleration or deceleration zones. However, it is also possible to define the function $\partial_T(x_1, x_2)$ such that this equality does not hold true, permitting asymmetry of the extent of rate changes associated with cursor locations in corresponding locations of acceleration and deceleration zones. In a preferred embodiment, the reader has the ability to define or select the mathematical functions that govern the rate of text presentation. For example, in some cases the reader may prefer to set a maximum rate of text presentation, such that incidental presence of the cursor in an acceleration zone does not result in a rate of text presentation in excess of the reader's preferred reading speed, which could cause discomfort and would likely only result in a downward adjustment in speed as the reader falls behind and the cursor moves to a deceleration zone.

In a preferred embodiment, should the cursor

continuously signify text which precedes that presented in the neutral zone, so that at some time T the function r_T becomes less than zero, the text begins to scroll backwards (along the pathway defined on the display) rather than forwards, such that a
5 negative rate of text presentation corresponds to reverse scrolling. Should the cursor be located in a stop zone, r_T becomes zero, and the scrolling of the text ceases.

In some preferred embodiments, a time lag between initiation of a rate change and the presence of the cursor in an
10 acceleration or deceleration zone is introduced. This feature prevents unwanted rate changes from occurring as a result of unintended and/or momentary movement of the cursor out of the neutral zone.

The interface of the present invention is of
15 significant value when the cursor control device signals the computer system regarding changes in head or eye position. Using natural head or eye movements, the user can control the rate of text presentation in a manner which corresponds to the desired reading speed. FIG. 3 illustrates one possible definition of
20 these zones on a sample text which is scrolled from the bottom of a standard text window. If the user is capable of reading faster than text is being presented, the user will look down farther on the page (330), causing the rate of text display to accelerate and naturally leading the reader's head or eye back towards the
25 neutral zone (shaded, 310). Should the user need to slow down, she will fall behind, leading to eye or head movements above the

defined as an acceleration zone. Once the user reaches that acceleration zone, it causes the next page of text to be displayed in the second window, and redefines that acceleration zone as a neutral zone, permitting continued reading in the region previously defined as an acceleration zone. Likewise, when the user reaches an acceleration zone defined at the bottom of the second window, the succeeding page is caused to be displayed in the first window and that acceleration zone is redefined as a neutral zone. Corresponding deceleration zones are defined at the top of each window, but are only active after the user has first read past them to the next window. In some of these embodiments, one or more of the defined zones may be absent.

In another preferred embodiment, the invention is provided as a part of a computer program whose purpose includes the display of text. In this situation, an appropriate means (e.g., use of keystrokes, point and click device action) to signal the program to begin and end the execution of the functions of this invention is also provided.

The primary input device for this invention is a cursor control device, broadly defined as any device capable of providing input to a computer with respect to external movements or designations of changes in screen positions. This input need not provide specific information on screen location, but could also be used to identify relative movements (e.g., based on directions) to obtain substantially the same result.

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Furthermore, it will be recognized by those skilled in the art that precise screen locations might not be computed for all cursor control devices. Computer system acceptance of cursor control device input in a manner such that cursor-control device
5 movements could be mathematically mapped to screen locations with results as defined in this description also falls within the scope and claims of this invention. The cursor position as defined in this description may be the same as the cursor which is controlled by any cursor control device associated with the
10 computer system. A computer system may thus have multiple cursor control devices and cursors associated with it. In addition, although the cursor position is calculated in the course of practicing the described preferred embodiment of this invention, in some embodiments a cursor might not be displayed. Thus, in
15 this description, the cursor position may be defined as a region of the display which corresponds to the information collected by a device which may be used to signal cursor position, but does not necessarily require the display of a cursor, or the ability of the computer to use this cursor in any context other than that
20 described here.

In a further preferred embodiment, the computer may be signalled to change the described cursor location by pressing appropriate keys on a keyboard communicating with the computer system. For example, arrow keys may be defined in the context of
25 the described cursor, and movement of the cursor could be initiated by depressing the appropriate arrow keys. In addition,

in a preferred embodiment, a keyboard could be used to implement various operations such as stopping, reverse-scrolling, or searching a text. Similarly, other methods of providing input to a computer system regarding movement in different directions or the location at which text is being read aloud, whether or not they cause a cursor to move on the screen, may be used in the practice of this invention, not limited to the types of devices which identify eye or head movement or recognize voice as described above.

It will be apparent to those skilled in the art that the invention described herein is not limited to the specific preferred embodiments discussed above. For example, although the above discussion describes a program using a cursor control device which detects head or eye movements or recognizes speech on a Windows™ platform, those skilled in the art will recognize that the invention could also be practiced with input devices such as trackballs, joysticks, light pens, mouses, touch-sensitive display panels and the like, and could also be usefully implemented on platforms such as Macintosh, X-Windows, NextStep, OS/2, Motif, Unix, Linux, Gnutella and the like. In addition, it will also be apparent to those skilled in the art that embodiments of this user interface which provide results equivalent to those obtained using the functions t , d_T , σ , ∂_T , and r_T as described above also fall within the scope of this invention and claims, even if specific values for each of these

Claims

I claim:

1. A method for using a computer system to permit a reader of a
5 text that is presented on a computer display controlled by
the computer system to optimize the rate at which text is
presented, comprising the steps of:

determining the location on the computer display at which
10 text is being read aloud by the reader; and

varying the rate at which text is presented in response to
the result of the location-determining step.

- 15 2. The method of claim 1, further comprising the steps of:

defining a cursor location as a location on the display
corresponding to the location at which text is being read
aloud;

20 defining a neutral zone as at least one region of the
display at which reading preferably takes place;

25 defining at least one region of the display as a
deceleration zone, associated with the presentation of text
which comes before the text displayed in the neutral zone at

any given time, such that when the defined cursor signifies a location within a deceleration zone, the rate of text presentation decreases according to a mathematical function of the distance between the location signified by the cursor and the neutral zone; and

defining at least one region of the display as an acceleration zone, associated with the presentation of text which comes after the text displayed in the neutral zone at any given time, such that when the defined cursor signifies a location within an acceleration zone, the rate of text presentation increases according to a mathematical function of the distance between the location signified by the cursor and the neutral zone.

3. The method of claim 1, further comprising the step of defining a region of the display as a neutral zone, such that the rate of text presentation does not change appreciably when the text being read aloud is displayed in a neutral zone.

4. The method of claim 1, further comprising the step of defining input to the computer system that stops continued scrolling of the text.

5. The method of claim 4, wherein the input to the computer

system that stops continued scrolling of the text comprises defining at least one region of the display as a stop zone, such that when a defined cursor signifies a stop zone, further scrolling of text ceases.

5

6. The method of claim 1, further comprising the step of defining input to the computer system that causes the text to scroll backwards.

- 10 7. The method of claim 3, wherein changes in the rate of text presentation depend on a function of the distance between the location at which text is being read aloud and a neutral zone.

- 15 8. The method of claim 3, wherein the rate of text presentation depends on a function of distance between the location at which text is being read aloud and a neutral zone.

- 20 9. The method of claim 2, further comprising the step of defining at least one zone graphically.

10. The method of claim 9, further comprising the step of defining at least one zone by using a cursor control device to specify its limits and shape.

25

11. The method of claim 2, wherein at least one zone is

differentiated from other zones by differing attributes of characters displayed within the at least one zone.

12. The method of claim 2, wherein at least one zone is differentiated from other zones by differing attributes of the display background within the at least one zone.

13. The method of claim 2, wherein the location of at least one zone may be changed depending on the location at which text is being read.

14. The method of claim 1, wherein the location at which text is being read is determined by use of voice recognition software.

15. The method of claim 1, wherein the computer system determines the location at which text is being read aloud by comparing what is said with what is written in the electronic text.

16. The method of claim 1, wherein the text is supplied over a network.

17. The method of claim 1, wherein information about the location at which text is being read aloud is provided over a network.

18. The method of claim 2, wherein the cursor is not presented on a display device.

5 19. A computer memory storage device encoded with a computer program for using a computer system to display electronic text comprising:

means for determining the location on the computer display
10 at which text is being read aloud by the reader; and

means for varying the rate at which text is presented in response to the result of the location-determining step.

15 20. A computer system for displaying electronic text comprising:

a display device controlled by the computer, said display device imaging a portion of said text controlled by the computer system;

20 means for determining the location on the computer display at which text is being read aloud by the reader; and

25 means for varying the rate at which text is presented in response to the result of the location-determining step.

Abstract

An apparatus, method and article of manufacture of the present invention provide an improved teleprompter device.

- 5 The invention provides a method for defining a region of the display at which text is preferably read, and further provides a user interface for adjusting the speed of text display according to a screen location corresponding to that at which text is being read aloud at any time.

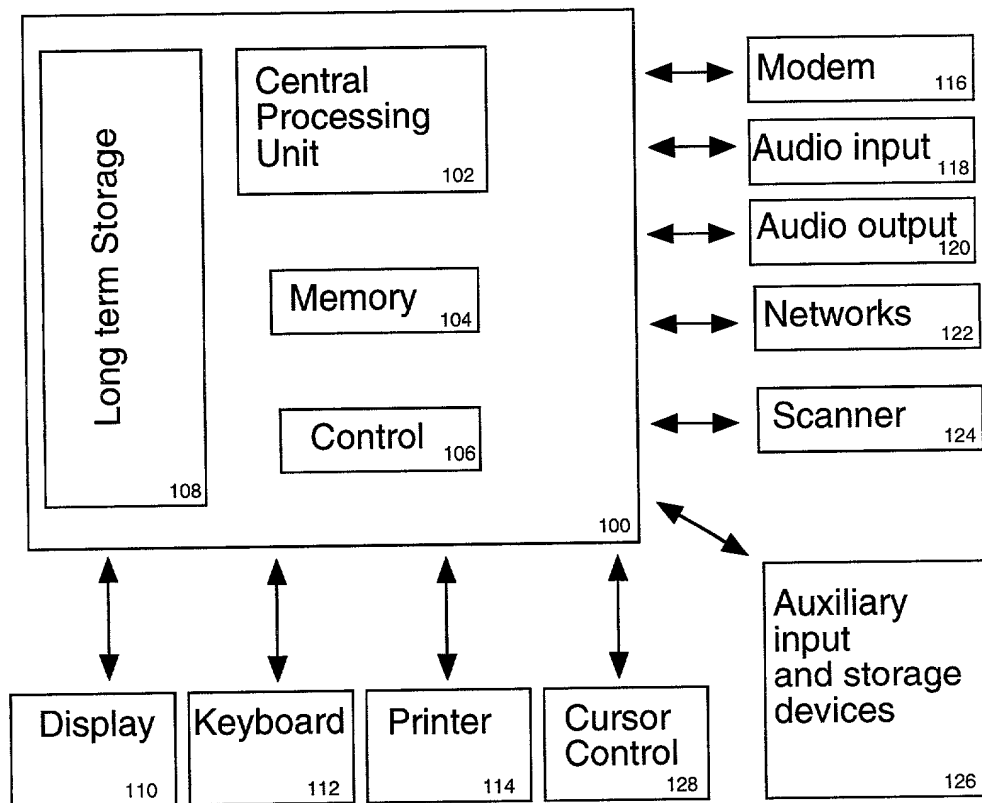


FIGURE 1. Computer system

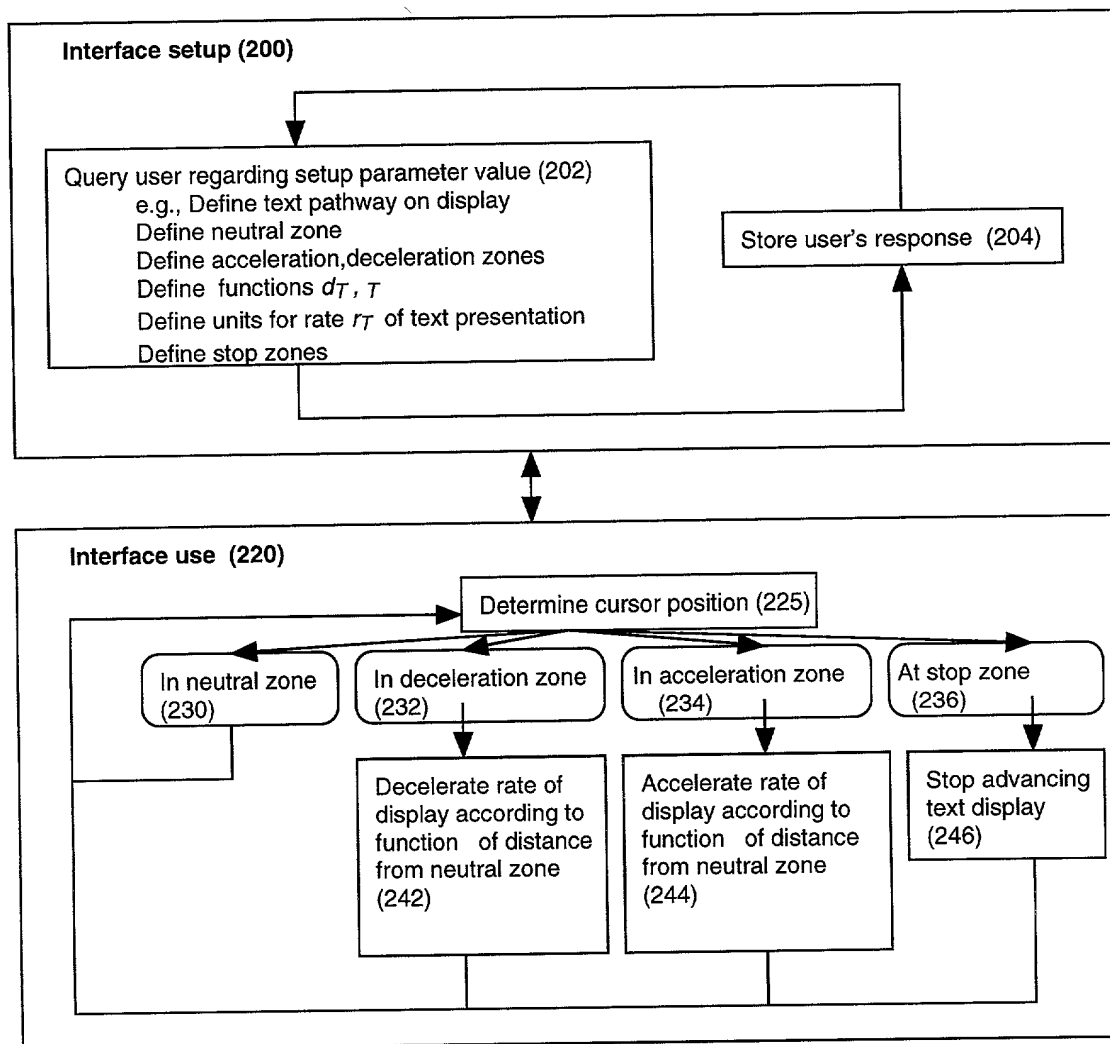


Figure 2. Flow diagram of the invention.

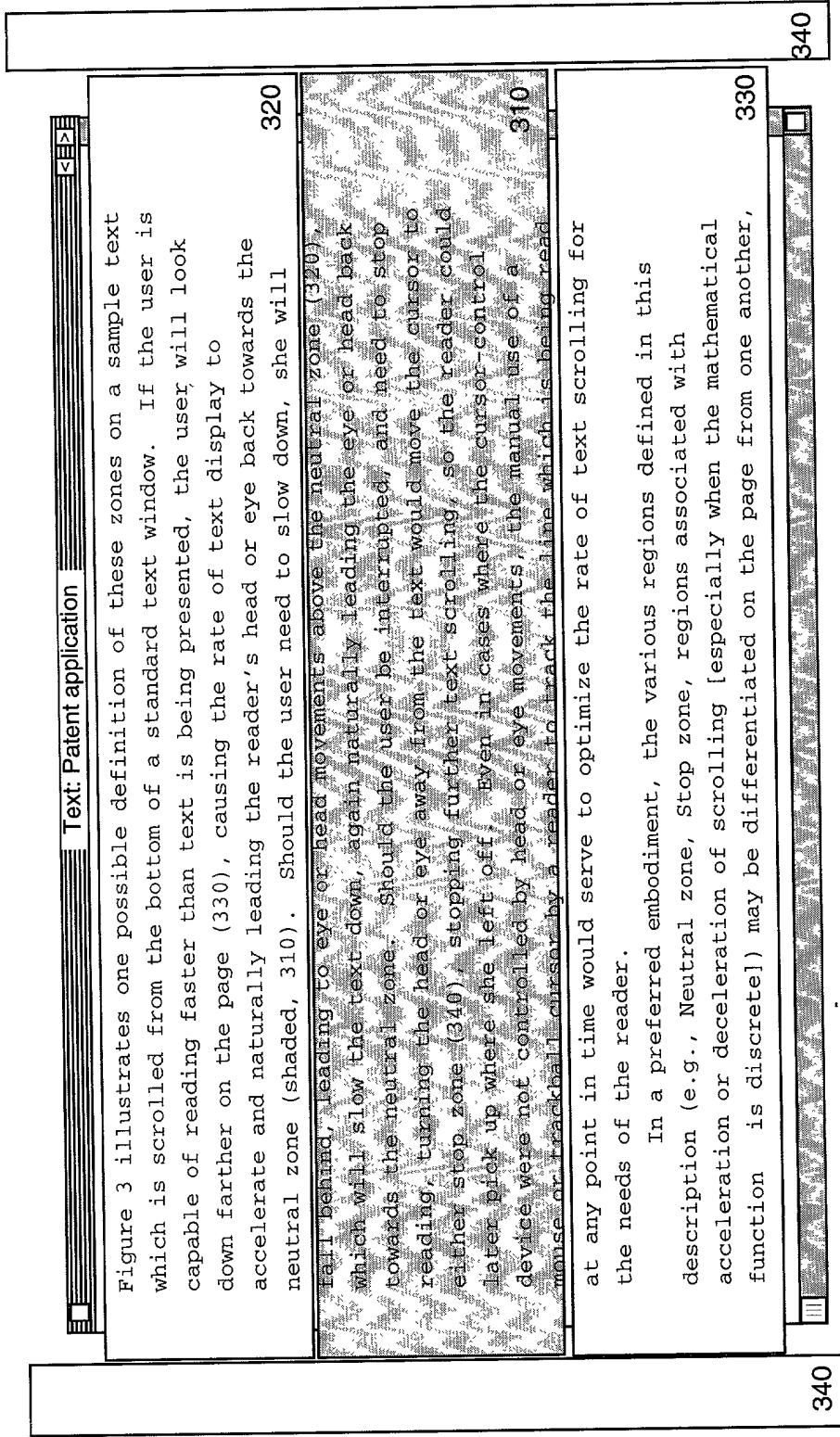


Figure 3

a) 1998-1999		b) 2000-2001		c) 2002-2003		d) 2004-2005		e) 2006-2007		f) 2008-2009		g) 2010-2011		h) 2012-2013		i) 2014-2015		j) 2016-2017		k) 2018-2019		l) 2020-2021		m) 2022-2023		n) 2024-2025		o) 2026-2027		p) 2028-2029		q) 2030-2031		r) 2032-2033		s) 2034-2035		t) 2036-2037		u) 2038-2039		v) 2040-2041		w) 2042-2043		x) 2044-2045		y) 2046-2047		z) 2048-2049		aa) 2050-2051		ab) 2052-2053		ac) 2054-2055		ad) 2056-2057		ae) 2058-2059		af) 2060-2061		ag) 2062-2063		ah) 2064-2065		ai) 2066-2067		aj) 2068-2069		ak) 2070-2071		al) 2072-2073		am) 2074-2075		an) 2076-2077		ao) 2078-2079		ap) 2080-2081		aq) 2082-2083		ar) 2084-2085		as) 2086-2087		at) 2088-2089		au) 2090-2091		av) 2092-2093		aw) 2094-2095		ax) 2096-2097		ay) 2098-2099		az) 2100-2101		ba) 2102-2103		bb) 2104-2105		bc) 2106-2107		bd) 2108-2109		be) 2110-2111		bf) 2112-2113		bg) 2114-2115		bh) 2116-2117		bi) 2118-2119		bj) 2120-2121		bk) 2122-2123		bl) 2124-2125		bm) 2126-2127		bn) 2128-2129		bo) 2130-2131		bp) 2132-2133		bq) 2134-2135		br) 2136-2137		bs) 2138-2139		bt) 2140-2141		bu) 2142-2143		bv) 2144-2145		bw) 2146-2147		bx) 2148-2149		by) 2150-2151		bz) 2152-2153		ca) 2154-2155		cb) 2156-2157		cc) 2158-2159		cd) 2160-2161		ce) 2162-2163		cf) 2164-2165		cg) 2166-2167		ch) 2168-2169		ci) 2170-2171		cj) 2172-2173		ck) 2174-2175		cl) 2176-2177		cm) 2178-2179		cn) 2180-2181		co) 2182-2183		cp) 2184-2185		cq) 2186-2187		cr) 2188-2189		cs) 2190-2191		ct) 2192-2193		cu) 2194-2195		cv) 2196-2197		cw) 2198-2199		cx) 2200-2201		cy) 2202-2203		cz) 2204-2205		da) 2206-2207		db) 2208-2209		dc) 2210-2211		dd) 2212-2213		de) 2214-2215		df) 2216-2217		dg) 2218-2219		dh) 2220-2221		di) 2222-2223		dj) 2224-2225		dk) 2226-2227		dl) 2228-2229		dm) 2230-2231		dn) 2232-2233		do) 2234-2235		dp) 2236-2237		dq) 2238-2239		dr) 2240-2241		ds) 2242-2243		dt) 2244-2245		du) 2246-2247		dv) 2248-2249		dw) 2250-2251		dx) 2252-2253		dy) 2254-2255		dz) 2256-2257		ea) 2258-2259		eb) 2260-2261		ec) 2262-2263		ed) 2264-2265		ee) 2266-2267		ef) 2268-2269		eg) 2270-2271		eh) 2272-2273		ei) 2274-2275		ej) 2276-2277		ek) 2278-2279		el) 2280-2281		em) 2282-2283		en) 2284-2285		eo) 2286-2287		ep) 2288-2289		eq) 2290-2291		er) 2292-2293		es) 2294-2295		et) 2296-2297		eu) 2298-2299		ev) 2300-2301		ew) 2302-2303		ex) 2304-2305		ey) 2306-2307		ez) 2308-2309		fa) 2310-2311		fb) 2312-2313		fc) 2314-2315		fd) 2316-2317		fe) 2318-2319		ff) 2320-2321		fg) 2322-2323		fh) 2324-2325		fi) 2326-2327		fj) 2328-2329		fk) 2330-2331		fl) 2332-2333		fm) 2334-2335		fn) 2336-2337		fo) 2338-2339		fp) 2340-2341		fq) 2342-2343		fr) 2344-2345		fs) 2346-2347		ft) 2348-2349		fu) 2350-2351		fv) 2352-2353		fw) 2354-2355		fx) 2356-2357		fy) 2358-2359		fz) 2360-2361		ga) 2362-2363		gb) 2364-2365		gc) 2366-2367		gd) 2368-2369		ge) 2370-2371		gf) 2372-2373		gg) 2374-2375		gh) 2376-2377		gi) 2378-2379		gj) 2380-2381		gk) 2382-2383		gl) 2384-2385		gm	
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My residence, post office address and citizenship are as stated below beneath my name.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims.

Address all telephone calls to Thomas W. Krause, Reg. No. 40,335, at (703) 533-6771.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Inventor's signature: Henry R. Khan Date: July 27, 2000

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